NAME _____ DATE _____ PERIOD ____

2-5

Study Guide and Intervention

Postulates and Paragraph Proofs

Points, Lines, and Planes In geometry, a **postulate** is a statement that is accepted as true. Postulates describe fundamental relationships in geometry.

Postulate: Through any two points, there is exactly one line.
Postulate: Through any three points not on the same line, there is exactly one plane.
Postulate: A line contains at least two points.
Postulate: A plane contains at least three points not on the same line.
Postulate: If two points lie in a plane, then the line containing those points lies in the plane.
Postulate: If two lines intersect, then their intersection is exactly one point.
Postulate: If two planes intersect, then their intersection is a line.

Example **Determine whether each statement is *always*, *sometimes*, or *never* true.**

a. There is exactly one plane that contains points *A*, *B*, and *C*.

Sometimes; if A, B, and C are collinear, they are contained in many planes. If they are noncollinear, then they are contained in exactly one plane.

b. Points *E* and *F* are contained in exactly one line.

Always; the first postulate states that there is exactly one line through any two points.

c. Two lines intersect in two distinct points *M* and *N*.

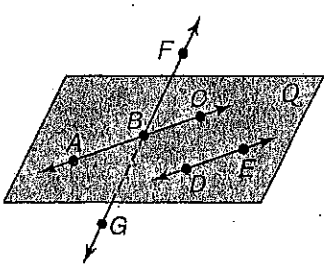
Never; the intersection of two lines is one point.

Exercises

Use postulates to determine whether each statement is *always*, *sometimes*, or *never* true.

1. A line contains exactly one point.
2. Noncollinear points R, S, and T are contained in exactly one plane.
3. Any two lines ℓ and m intersect.
4. If points G and H are contained in plane $\mathcal{M}$, then $\overline{GH}$ is perpendicular to plane $\mathcal{M}$.
5. Planes $\mathcal{R}$ and $\mathcal{S}$ intersect in point T.
6. If points A, B, and C are noncollinear, then segments $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$ are contained in exactly one plane.

In the figure, $\overline{AC}$ and $\overline{DE}$ are in plane Q and $\overline{AC} \parallel \overline{DE}$. State the postulate that can be used to show each statement is true.



7. Exactly one plane contains points F, B, and E.
8. $\overleftrightarrow{BE}$ lies in plane Q.

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Skills Practice

Postulates and Paragraph Proofs

Determine the number of line segments that can be drawn connecting each pair of points.

1.

2.

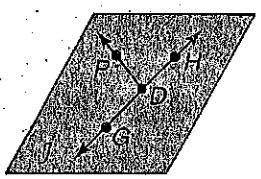
Determine whether the following statements are *always*, *sometimes*, or *never* true. Explain.

3. Three collinear points determine a plane.

4. Two points A and B determine a line.

5. A plane contains at least three lines.

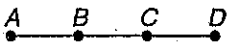
In the figure, $\overleftrightarrow{DG}$ and $\overleftrightarrow{DP}$ lie in plane J and H lies on $\overleftrightarrow{DG}$. State the postulate that can be used to show each statement is true.



6. G and P are collinear.

7. Points D, H, and P are coplanar.

8. PROOF In the figure at the right, point B is the midpoint of $\overline{AC}$ and point C is the midpoint of $\overline{BD}$. Write a paragraph proof to prove that $AB = CD$.



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